

Ozone: Clean Technology for the Health and Sustainability of Agriculture

A key requirement for agriculture, both now and in the year 2030, is safety. Our food supply must be kept safe from contamination by pathogenic microorganisms. This is especially critical for fresh fruits and vegetables which may be consumed without cooking (which destroys microbes). Our vision for agriculture in 2030 is germ-free produce through the judicious application of ozone in anti-microbial intervention processes in produce supply (picking and packing) as well as in distribution and retail settings.

Ozone, the tri-atomic form of oxygen (O_3), is a very powerful oxidizer with twice the oxidizing potential of traditional sanitizers. Ozone is replacing traditional chemical oxidants in a growing number of industrial processes, including produce, food, beverage, and dairy processing.

Ozone destroys all common pathogenic organisms through natural processes of oxidation, disinfection, and decomposition to divalent oxygen (O_2). In these reactions, the unstable third oxygen atom is transferred, with a large release of energy, from ozone to the molecule being oxidized. The transfer of energy in oxidation causes the outer membranes of microorganisms to rupture.

Ozone-injected water can be used in a wide range of applications in food processing:

- Wash fresh produce and fruit
- Clean-in-place (CIP) processes
- Surface sanitation: equipment, tools, storage bins, and refrigeration units
- Sanitization of processing and handling equipment
- Preserve food products/extend shelf life
- Process water prep
- Ozone ice
- Wastewater processing and re-use

Ozone is not only a clean technology, but it is green and sustainable as well. Ozone is most stable and effective at lower temperatures. This allows ozone to effectively sanitize in cold water, saving valuable energy by replacing steam and hot water. Ozone can also reduce the chemicals needed for sanitizing. Further, ozone naturally returns to divalent oxygen (O_2) leaving few undesirable byproducts.

A summary of the benefits of ozone in produce and food processing:

- Superior sanitizing power (greater efficacy)
 - Ozone is the most powerful and effective commercially available sanitizer
- Minimum impact on environment
 - Smaller carbon and water footprints
 - Reduces chemical demand and waste
 - Few harmful byproducts
 - Improves wastewater quality (reduces chemical and biological oxygen demand (COD and BOD))

- Increases efficiency
 - Cost Savings: less water, energy, chemicals needed
 - Efficiency gains: manpower, time, capital and plant utilization, productivity
 - Increases profitability
- Improves Safety:
 - Ozone has an excellent safety record in over 100 years of use
 - Reduces worker exposure to hazardous chemicals
 - Ozone is produced on demand, eliminating storage of dangerous chemicals and risk of accidental release
- Yields greater net benefit to mankind

Ozone is a very important clean, green, and sustainable technology that must be included in this visioning process.

Thank you for considering this input in the Ag Vision 2030 program.

Bob Smith-McCollum
Vice President
Pacific Ozone, Benicia, California
www.pacificozone.com